

$\chi_{c2}(1P)$ $I^G(J^{PC}) = 0^+(2^{++})$

See the Review on “ $\psi(2S)$ and χ_c branching ratios” before the
 $\chi_{c0}(1P)$ Listings.

 $\chi_{c2}(1P)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
3556.20 ± 0.09 OUR AVERAGE				
3555.70 ± 0.59 ± 0.39		ABLIKIM 05G	BES2	$\psi(2S) \rightarrow \gamma \chi_{c2}$
3556.173 ± 0.123 ± 0.020		ANDREOTTI 05A	E835	$p\bar{p} \rightarrow e^+ e^- \gamma$
3559.9 ± 2.9		EISENSTEIN 01	CLE2	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
3556.4 ± 0.7		BAI 99B	BES	$\psi(2S) \rightarrow \gamma X$
3556.22 ± 0.131 ± 0.020	585	¹ ARMSTRONG 92	E760	$\bar{p}p \rightarrow e^+ e^- \gamma$
3556.9 ± 0.4 ± 0.5	50	BAGLIN 86B	SPEC	$\bar{p}p \rightarrow e^+ e^- X$
3557.8 ± 0.2 ± 4		² GAISER 86	CBAL	$\psi(2S) \rightarrow \gamma X$
3553.4 ± 2.2	66	³ LEMOIGNE 82	GOLI	$185 \pi^- Be \rightarrow \gamma \mu^+ \mu^- A$
3555.9 ± 0.7		OREGLIA 82	CBAL	$e^+ e^- \rightarrow J/\psi 2\gamma$
3557 ± 1.5	69	⁵ HIMEL 80	MRK2	$e^+ e^- \rightarrow J/\psi 2\gamma$
3551 ± 11	15	BRANDELIK 79B	DASP	$e^+ e^- \rightarrow J/\psi 2\gamma$
3553 ± 4		⁵ BARTEL 78B	CNTR	$e^+ e^- \rightarrow J/\psi 2\gamma$
3553 ± 4 ± 4		^{5,6} TANENBAUM 78	MRK1	$e^+ e^-$
3563 ± 7	360	⁵ BIDDICK 77	CNTR	$e^+ e^- \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3543 ± 10	4	WHITAKER 76	MRK1	$e^+ e^- \rightarrow J/\psi 2\gamma$

¹ Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03.

² Using mass of $\psi(2S) = 3686.0$ MeV.

³ $J/\psi(1S)$ mass constrained to 3097 MeV.

⁴ Assuming $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV.

⁵ Mass value shifted by us by amount appropriate for $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV.

⁶ From a simultaneous fit to radiative and hadronic decay channels.

 $\chi_{c2}(1P)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2.05 ± 0.12 OUR FIT				
1.95 ± 0.13 OUR AVERAGE				
1.915 ± 0.188 ± 0.013		ANDREOTTI 05A	E835	$p\bar{p} \rightarrow e^+ e^- \gamma$
1.96 ± 0.17 ± 0.07	585	⁷ ARMSTRONG 92	E760	$\bar{p}p \rightarrow e^+ e^- \gamma$
2.6 ± 1.4 -1.0	50	BAGLIN 86B	SPEC	$\bar{p}p \rightarrow e^+ e^- X$
2.8 ± 2.1 -2.0		⁸ GAISER 86	CBAL	$\psi(2S) \rightarrow \gamma X$

⁷ Recalculated by ANDREOTTI 05A.

⁸ Errors correspond to 90% confidence level; authors give only width range.

$\chi_{c2}(1P)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Hadronic decays		
Γ_1 $2(\pi^+\pi^-)$	(1.25 ± 0.16) %	
Γ_2 $\pi^+\pi^-K^+K^-$	(1.00 ± 0.26) %	S=1.6
Γ_3 $3(\pi^+\pi^-)$	(8.7 ± 1.8) $\times 10^{-3}$	
Γ_4 $K^+\bar{K}^*(892)^0\pi^- + \text{c.c.}$	(4.8 ± 2.8) $\times 10^{-3}$	
Γ_5 $K^*(892)^0\bar{K}^*(892)^0$	(3.8 ± 0.8) $\times 10^{-3}$	
Γ_6 $\phi\phi$	(1.8 ± 0.4) $\times 10^{-3}$	
Γ_7 $\omega\omega$	(2.0 ± 0.7) $\times 10^{-3}$	
Γ_8 $\pi\pi$	(2.17 ± 0.25) $\times 10^{-3}$	
Γ_9 $\rho^0\pi^+\pi^-$	(7 ± 4) $\times 10^{-3}$	
Γ_{10} $\pi^+\pi^-\eta$	(5.6 ± 1.5) $\times 10^{-4}$	
Γ_{11} $\pi^+\pi^-\eta'$	(5.9 ± 2.2) $\times 10^{-4}$	
Γ_{12} $\eta\eta$	< 5 $\times 10^{-4}$	CL=90%
Γ_{13} K^+K^-	(7.8 ± 1.4) $\times 10^{-4}$	
Γ_{14} $K_S^0K_S^0$	(6.8 ± 1.1) $\times 10^{-4}$	
Γ_{15} $K^0K^+\pi^- + \text{c.c.}$	(1.0 ± 0.4) $\times 10^{-3}$	S=2.6
Γ_{16} $K^+K^-\pi^0$	(3.6 ± 0.9) $\times 10^{-4}$	
Γ_{17} $K^+K^-\eta$	< 4 $\times 10^{-4}$	CL=90%
Γ_{18} $\eta\pi^+\pi^-$	< 1.7 $\times 10^{-3}$	CL=90%
Γ_{19} $\eta\eta'$	< 2.6 $\times 10^{-4}$	CL=90%
Γ_{20} $\eta'\eta'$	< 4 $\times 10^{-4}$	CL=90%
Γ_{21} $\pi^+\pi^-K_S^0K_S^0$	(2.6 ± 0.6) $\times 10^{-3}$	
Γ_{22} $K^+K^-K_S^0K_S^0$	< 4 $\times 10^{-4}$	CL=90%
Γ_{23} $K^+K^-K^+K^-$	(1.79 ± 0.26) $\times 10^{-3}$	
Γ_{24} $K^+K^-\phi$	(1.67 ± 0.35) $\times 10^{-3}$	
Γ_{25} $K_S^0K_S^0p\bar{p}$	< 7.9 $\times 10^{-4}$	CL=90%
Γ_{26} $p\bar{p}$	(6.6 ± 0.5) $\times 10^{-5}$	
Γ_{27} $p\bar{p}\pi^0$	(5.1 ± 1.1) $\times 10^{-4}$	
Γ_{28} $p\bar{p}\eta$	(2.2 ± 0.8) $\times 10^{-4}$	
Γ_{29} $\pi^+\pi^-p\bar{p}$	(1.34 ± 0.34) $\times 10^{-3}$	
Γ_{30} $p\bar{n}\pi^-$	(1.2 ± 0.4) $\times 10^{-3}$	
Γ_{31} $\Lambda\bar{\Lambda}$	(2.8 ± 1.3) $\times 10^{-4}$	
Γ_{32} $\Lambda\bar{\Lambda}\pi^+\pi^-$	< 3.5 $\times 10^{-3}$	CL=90%
Γ_{33} $K^+\bar{p}\Lambda + \text{c.c.}$	(9.8 ± 1.9) $\times 10^{-4}$	
Γ_{34} $\Xi^-\bar{\Xi}^+$	< 3.7 $\times 10^{-4}$	CL=90%
Γ_{35} $J/\psi(1S)\pi^+\pi^-\pi^0$	< 1.5 %	CL=90%
Radiative decays		
Γ_{36} $\gamma J/\psi(1S)$	(20.3 ± 1.0) %	
Γ_{37} $\gamma\gamma$	(2.58 ± 0.19) $\times 10^{-4}$	

$\chi_{c2}(1P)$ PARTIAL WIDTHS**— $\chi_{c2}(1P) \Gamma(i)\Gamma(\gamma J/\psi(1S))/\Gamma(\text{total})$ —**

$$\Gamma(p\bar{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}} \quad \Gamma_{26}\Gamma_{36}/\Gamma$$

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
27.4 ± 1.4 OUR FIT			
27.5 ± 1.5 OUR AVERAGE			
27.0 $\pm 1.5 \pm 1.1$	⁹ ANDREOTTI 05A	E835	$p\bar{p} \rightarrow e^+ e^- \gamma$
27.7 $\pm 1.5 \pm 2.0$	^{9,10} ARMSTRONG 92	E760	$\bar{p}p \rightarrow e^+ e^- \gamma$
36 ± 8	⁹ BAGLIN 86B	SPEC	$\bar{p}p \rightarrow e^+ e^- X$

$$\Gamma(\gamma\gamma) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}} \quad \Gamma_{37}\Gamma_{36}/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
108 ± 8 OUR FIT				
117 ± 10 OUR AVERAGE				
111 $\pm 12 \pm 9$	147 ± 15	¹¹ DOBBS	06 CLE3	$10.4 e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
114 $\pm 11 \pm 9$	136 ± 13.3	^{11,12} ABE	02T BELL	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
139 $\pm 55 \pm 21$		^{11,13} ACCIARRI	99E L3	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
242 $\pm 65 \pm 51$		^{11,14} ACKERSTAFF,K...	98 OPAL	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
150 $\pm 42 \pm 36$		^{11,15} DOMINICK	94 CLE2	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
470 $\pm 240 \pm 120$		^{11,16} BAUER	93 TPC	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$

⁹ Calculated by us using $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.0593 \pm 0.0010$.

¹⁰ Recalculated by ANDREOTTI 05A.

¹¹ Calculated by us using $B(J/\psi \rightarrow \ell^+ \ell^-) = 0.1187 \pm 0.0008$.

¹² All systematic errors added in quadrature.

¹³ The value for $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$ reported in ACCIARRI 99E is derived using $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) \times B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.0162 \pm 0.0014$.

¹⁴ The value for $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$ reported in ACKERSTAFF,K 98 is derived using $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) = 0.135 \pm 0.011$ and $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1203 \pm 0.0038$.

¹⁵ The value for $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$ reported in DOMINICK 94 is derived using $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) = 0.135 \pm 0.011$, $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.0627 \pm 0.0020$, and $B(J/\psi(1S) \rightarrow \mu^+ \mu^-) = 0.0597 \pm 0.0025$.

¹⁶ The value for $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$ reported in BAUER 93 is derived using $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) = 0.135 \pm 0.011$, $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.0627 \pm 0.0020$, and $B(J/\psi(1S) \rightarrow \mu^+ \mu^-) = 0.0597 \pm 0.0025$.

— $\chi_{c2}(1P) \Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$ —

$$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_1\Gamma_{37}/\Gamma$$

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
6.6 ± 0.9 OUR FIT			
$6.4 \pm 1.8 \pm 0.8$	EISENSTEIN 01	CLE2	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$

$$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_8\Gamma_{37}/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
1.15 ± 0.12 OUR FIT				
$1.14 \pm 0.21 \pm 0.17$	54 ± 10	¹⁷ NAKAZAWA 05	BELL	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$

$\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$	$\Gamma_{13}\Gamma_{37}/\Gamma$			
<u>VALUE (eV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.41±0.05 OUR FIT				
0.44±0.11±0.07	33 ± 8	NAKAZAWA 05	BELL	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$

¹⁷ We have multiplied $\pi^+ \pi^-$ measurement by 3/2 to obtain $\pi\pi$.

$\chi_{c2}(1P)$ BRANCHING RATIOS

— HADRONIC DECAYS —

$\Gamma(2(\pi^+ \pi^-))/\Gamma_{\text{total}}$	Γ_1/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u>
0.0125±0.0016 OUR FIT	

$\Gamma(\pi^+ \pi^- K^+ K^-)/\Gamma_{\text{total}}$	Γ_2/Γ		
<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
10.0±2.6 OUR EVALUATION	Error includes scale factor of 1.6.	Treating systematic error as correlated.	
10.0±3.5 OUR AVERAGE	Error includes scale factor of 2.2.		
7.6±0.6±1.8	¹⁸ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c2}$
15.2±2.7±0.8	¹⁸ TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma \chi_{c2}$

$\Gamma(3(\pi^+ \pi^-))/\Gamma_{\text{total}}$	Γ_3/Γ		
<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
8.7±1.8 OUR EVALUATION	Treating systematic error as correlated.		
8.7±1.8 OUR AVERAGE			
8.7±1.0±1.6	¹⁸ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c2}$
8.8±6.0±0.5	¹⁸ TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma \chi_{c2}$

$\Gamma(K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma_{\text{total}}$	Γ_4/Γ		
<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
48±28	¹⁹ TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma \chi_{c2}$

$\Gamma(K^*(892)^0 \bar{K}^*(892)^0)/\Gamma_{\text{total}}$	Γ_5/Γ			
<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
3.8±0.7±0.2	57.5 ± 6.4	^{20,21} ABLIKIM	04H BES	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^+ \pi^-$

$\Gamma(\phi\phi)/\Gamma_{\text{total}}$	Γ_6/Γ
<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>
1.8±0.4 OUR FIT	

$\Gamma(\omega\omega)/\Gamma_{\text{total}}$	Γ_7/Γ			
<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.0±0.7±0.1	27.7 ± 7.4	²² ABLIKIM	05N BES2	$\psi(2S) \rightarrow \gamma \chi_{c2} \rightarrow \gamma 6\pi$

$\Gamma(\pi\pi)/\Gamma_{\text{total}}$	Γ_8/Γ
<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>
2.17±0.25 OUR FIT	

$\Gamma(\rho^0 \pi^+ \pi^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-4})

68±40

$\Gamma(\pi^+ \pi^- \eta)/\Gamma_{\text{total}}$

VALUE (units 10^{-3})

0.56±0.15±0.03

$\Gamma(\pi^+ \pi^- \eta')/\Gamma_{\text{total}}$

VALUE (units 10^{-3})

0.59±0.21±0.03

$\Gamma(\eta\eta)/\Gamma_{\text{total}}$

VALUE (units 10^{-4})

< 5

• • • We do not use the following data for averages, fits, limits, etc. • • •

<12

7.9±4.1±2.4

$\Gamma(K^+ K^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-3})

0.78±0.14 OUR FIT

$\Gamma(K_S^0 K_S^0)/\Gamma_{\text{total}}$

VALUE (units 10^{-3})

0.68±0.11 OUR FIT

$\Gamma(K^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$

VALUE (units 10^{-3})

1.0 ±0.4 OUR AVERAGE

1.50±0.24±0.07

0.60±0.22±0.03

• • • We do not use the following data for averages, fits, limits, etc. • • •

<2.0

90

$\Gamma(K^+ K^- \pi^0)/\Gamma_{\text{total}}$

VALUE (units 10^{-3})

0.36±0.09±0.02

$\Gamma(K^+ K^- \eta)/\Gamma_{\text{total}}$

VALUE (units 10^{-3})

<0.4

90

$\Gamma(\eta \pi^+ \pi^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-3})

<1.7

90

	DOCUMENT ID	TECN	COMMENT
19	TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma \chi_{c2}$

Γ_9/Γ

	DOCUMENT ID	TECN	COMMENT
23	ATHAR 07	CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

Γ_{10}/Γ

	DOCUMENT ID	TECN	COMMENT
24	ATHAR 07	CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

Γ_{11}/Γ

	DOCUMENT ID	TECN	COMMENT
25	ADAMS 07	CLEO	$\psi(2S) \rightarrow \gamma \chi_{c2}$

Γ_{12}/Γ

	DOCUMENT ID	TECN	COMMENT
18	BAI 03C	BES	$\psi(2S) \rightarrow \gamma \eta \eta \rightarrow 5\gamma$

	DOCUMENT ID	TECN	COMMENT
26	LEE 85	CBAL	$\psi' \rightarrow \text{photons}$

Γ_{13}/Γ

DOCUMENT ID

Γ_{14}/Γ

DOCUMENT ID

Γ_{15}/Γ

DOCUMENT ID TECN COMMENT

Error includes scale factor of 2.6.

27 ATHAR 07 CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$

28 ABLIKIM 06R BES2 $\psi(2S) \rightarrow \gamma \chi_{c2}$

• • • We do not use the following data for averages, fits, limits, etc. • • •

18 BAI 99B BES $\psi(2S) \rightarrow \gamma \chi_{c2}$

Γ_{16}/Γ

	DOCUMENT ID	TECN	COMMENT
29	ATHAR 07	CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

Γ_{17}/Γ

	DOCUMENT ID	TECN	COMMENT
30	ATHAR 07	CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

Γ_{18}/Γ

	DOCUMENT ID	TECN	COMMENT
31	ABLIKIM 06R	BES2	$\psi(2S) \rightarrow \gamma \chi_{c2}$

$\Gamma(\eta\eta')/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>
<2.6	90

Γ_{19}/Γ

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
32 ADAMS	07	CLEO $\psi(2S) \rightarrow \gamma \chi_{c2}$

$\Gamma(\eta'\eta')/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>
<4	90

Γ_{20}/Γ

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
33 ADAMS	07	CLEO $\psi(2S) \rightarrow \gamma \chi_{c2}$

$\Gamma(\pi^+\pi^- K_S^0 K_S^0)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>
2.6 ± 0.6 ± 0.1	57 ± 11

Γ_{21}/Γ

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
34 ABLIKIM	050 BES2	$\psi(2S) \rightarrow \gamma \chi_{c2}$

$\Gamma(K^+K^- K_S^0 K_S^0)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>
<4	90 2.3 ± 2.2

Γ_{22}/Γ

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
35 ABLIKIM	050 BES2	$e^+ e^- \rightarrow \chi_{c2} \gamma$

$\Gamma(K^+K^- K^+K^-)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>
1.79 ± 0.26 OUR FIT	

Γ_{23}/Γ

DOCUMENT ID

$\Gamma(K^+K^-\phi)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>
1.67 ± 0.34 ± 0.08	52

Γ_{24}/Γ

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
36 ABLIKIM	06T BES2	$\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

$\Gamma(K_S^0 K_S^0 p\bar{p})/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>
<7.9	90

Γ_{25}/Γ

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
37 ABLIKIM	06D BES2	$\psi(2S) \rightarrow \chi_{c2} \gamma$

$\Gamma(p\bar{p})/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>
0.66 ± 0.05 OUR FIT	

Γ_{26}/Γ

DOCUMENT ID

$\Gamma(p\bar{p}\pi^0)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>
0.51 ± 0.10 ± 0.03	

Γ_{27}/Γ

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
38 ATHAR	07	CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$

$\Gamma(p\bar{p}\eta)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>
0.22 ± 0.08 ± 0.01	

Γ_{28}/Γ

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
39 ATHAR	07	CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$

$\Gamma(\pi^+\pi^- p\bar{p})/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>
1.34 ± 0.34 OUR EVALUATION	Treating systematic error as correlated.

Γ_{29}/Γ

Error includes scale factor of 1.4.

1.18 ± 0.19 ± 0.31
2.68 ± 1.04 ± 0.14

¹⁸ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c2}$
¹⁸ TANENBAUM	78 MRK1	$\psi(2S) \rightarrow \gamma \chi_{c2}$

$\Gamma(p\bar{n}\pi^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-4})	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
12.±4.±1.	40 ABLIKIM	06I BES2	$\psi(2S) \rightarrow \gamma p\pi^- X$

 Γ_{30}/Γ

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 $\Gamma(\Lambda\bar{\Lambda})/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-4})	<u>EVTS</u>
2.8±1.2±0.5	$8.3^{+3.7}_{-3.4}$

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
18 BAI	03E BES	$\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma\Lambda\bar{\Lambda}$

 Γ_{31}/Γ

|

 $\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-3})	<u>CL%</u>
<3.5	90

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
37 ABLIKIM	06D BES2	$\psi(2S) \rightarrow \chi_{c2}\gamma$

 Γ_{32}/Γ

|

 $\Gamma(K^+\bar{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-3})
0.98±0.19±0.05

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
41 ATHAR	07 CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

 Γ_{33}/Γ

|

 $\Gamma(\Xi^-\bar{\Xi}^+)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-4})	<u>CL%</u>
<3.7	90

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
37 ABLIKIM	06D BES2	$\psi(2S) \rightarrow \chi_{c2}\gamma$

 Γ_{34}/Γ

|

 $\Gamma(J/\psi(1S)\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$

<u>VALUE</u>	<u>CL%</u>
<0.015	90

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
BARATE	81 SPEC	$190 \text{ GeV } \pi^- \text{ Be} \rightarrow 2\pi 2\mu$

 Γ_{35}/Γ

|

18 Rescaled by us using $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (8.1 \pm 0.4)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.3 \pm 0.5)\%$. Multiplied by a factor of 2 to convert from $K_S^0 K^+ \pi^-$ to $K^0 K^+ \pi^-$ decay.

19 Estimated using $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 0.078$; the errors do not contain the uncertainty in the $\psi(2S)$ decay.

20 ABLIKIM 04H reports $[B(\chi_{c2}(1P) \rightarrow K^*(892)^0 \bar{K}^*(892)^0) \times B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))] = (3.11 \pm 0.36 \pm 0.48) \times 10^{-4}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

21 Assumes $B(K^*(892)^0 \rightarrow K^-\pi^+) = 2/3$.

22 ABLIKIM 05N reports $[B(\chi_{c2}(1P) \rightarrow \omega\omega) \times B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))] = (0.165 \pm 0.044 \pm 0.032) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

23 ATHAR 07 reports $(0.49 \pm 0.12 \pm 0.06) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

24 ATHAR 07 reports $(0.51 \pm 0.18 \pm 0.06) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

25 ADAMS 07 reports $< 4.7 \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 0.081$.

- 26 Calculated using $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.078 \pm 0.008$.
- 27 ATHAR 07 reports $(1.3 \pm 0.2 \pm 0.1) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 28 ABLIKIM 06R reports $(0.6 \pm 0.2 \pm 0.1) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 29 ATHAR 07 reports $(0.31 \pm 0.07 \pm 0.04) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 30 ATHAR 07 reports $< 0.33 \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.081$.
- 31 ABLIKIM 06R reports $< 1.7 \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.081$.
- 32 ADAMS 07 reports $< 2.3 \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.081$.
- 33 ADAMS 07 reports $< 3.1 \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.081$.
- 34 ABLIKIM 050 reports $[B(\chi_{c2}(1P) \rightarrow \pi^+ \pi^- K_S^0 K_S^0) \times B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))] = (0.207 \pm 0.039 \pm 0.033) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 35 ABLIKIM 050 reports $[B(\chi_{c2}(1P) \rightarrow K^+ K^- K_S^0 K_S^0) \times B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))] = < 3.5 \times 10^{-5}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.081$.
- 36 ABLIKIM 06T reports $(1.67 \pm 0.26 \pm 0.24) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 37 Using $B(\psi(2S) \rightarrow \chi_{c2} \gamma) = (9.3 \pm 0.6)\%$.
- 38 ATHAR 07 reports $(0.44 \pm 0.08 \pm 0.05) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 39 ATHAR 07 reports $(0.19 \pm 0.07 \pm 0.02) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 40 ABLIKIM 06I reports $[B(\chi_{c2}(1P) \rightarrow p\bar{n}\pi^-) \times B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))] = (0.97 \pm 0.20 \pm 0.26) \times 10^{-4}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 41 ATHAR 07 reports $(0.85 \pm 0.14 \pm 0.10) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

RADIATIVE DECAYS

 $\Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$

VALUE
0.203±0.010 OUR FIT

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.199±0.005±0.012 42 ADAM 05A CLEO $e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$

 Γ_{36}/Γ $\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$

VALUE (units 10^{-4})
2.58±0.19 OUR FIT

DOCUMENT ID Γ_{37}/Γ $\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$

VALUE (units 10^{-3})
1.27±0.11 OUR FIT

0.99±0.18DOCUMENT ID Γ_{37}/Γ_{36} TECN COMMENT

43 AMBROGIANI 00B E835 $\bar{p}p \rightarrow \chi_{c2} \rightarrow \gamma\gamma, \gamma J/\psi$

 $\Gamma(\gamma\gamma) \times \Gamma(p\bar{p})/\Gamma_{\text{total}}^2$

VALUE (units 10^{-8})
1.70±0.20 OUR FIT

1.7 ±0.4 OUR AVERAGE

1.60±0.42

9.9 ±4.5

DOCUMENT IDTECNCOMMENTARMSTRONG 93 E760 $\bar{p}p \rightarrow \gamma\gamma X$ BAGLIN 87B SPEC $\bar{p}p \rightarrow \gamma\gamma X$ $\Gamma_{37}\Gamma_{26}/\Gamma^2$

42 Uses $B(\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma\gamma J/\psi)$ from ADAM 05A and $B(\psi(2S) \rightarrow \gamma\chi_{c2})$ from ATHAR 04.
 43 Calculated by us using $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0593 \pm 0.0010$.

 $\chi_{c2}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

$$B(\chi_{c2}(1P) \rightarrow p\bar{p}) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}$$

VALUE (units 10^{-5})
1.64±0.17 OUR FIT

1.4 ±1.1DOCUMENT IDTECNCOMMENT

44 BAI 98I BES $\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma\bar{p}p$

$$B(\chi_{c2}(1P) \rightarrow p\bar{p}) \times B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))$$

VALUE (units 10^{-6})
5.3±0.5 OUR FIT

4.4^{+1.6}_{-1.4}±0.6**14.3^{+5.2}_{-4.7}**EVTSDOCUMENT IDTECNCOMMENT

BAI 04F BES $\psi(2S) \rightarrow \gamma\chi_{c2}(1P) \rightarrow \gamma\bar{p}p$

$$B(\chi_{c2}(1P) \rightarrow K^+K^-) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}$$

VALUE (units 10^{-3})
0.195±0.017 OUR FIT

0.190±0.034±0.019**115 ± 13**EVTSDOCUMENT IDTECNCOMMENT

45 BAI 98I BES $\psi(2S) \rightarrow \gamma K^+K^-$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow K_S^0 K_S^0) \times \mathcal{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))$$

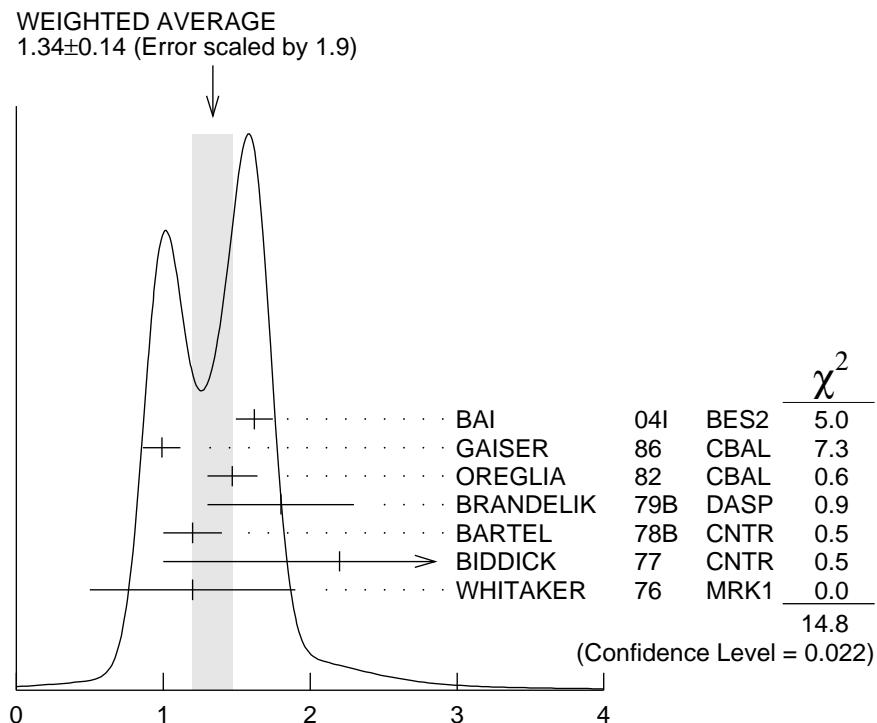
<i>VALUE</i> (units 10^{-5})	<i>EVTS</i>	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
5.5 ± 0.9 OUR FIT				
5.72 ± 0.76 ± 0.63	65	ABLIKIM	050 BES2	$\psi(2S) \rightarrow \gamma K_S^0 K_S^0$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow K_S^0 K_S^0) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)}$$

<i>VALUE</i> (units 10^{-5})	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
16.9 ± 1.5 OUR FIT			
14.7 ± 4.1 ± 3.3	46 BAI	99B BES	$\psi(2S) \rightarrow \gamma K_S^0 K_S^0$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) \times \mathcal{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))$$

<i>VALUE</i> (units 10^{-2})	<i>EVTS</i>	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
1.64 ± 0.04 OUR FIT				
1.34 ± 0.14 OUR AVERAGE				Error includes scale factor of 1.9. See the ideogram below.
1.62 ± 0.04 ± 0.12	5.8k	BAI	04I BES2	$\psi(2S) \rightarrow J/\psi \gamma \gamma$
0.99 ± 0.10 ± 0.08		GAISER	86 CBAL	$\psi(2S) \rightarrow \gamma X$
1.47 ± 0.17		47 OREGLIA	82 CBAL	$\psi(2S) \rightarrow \gamma \chi_{c2}$
1.8 ± 0.5		48 BRANDELIK	79B DASP	$\psi(2S) \rightarrow \gamma \chi_{c2}$
1.2 ± 0.2		48 BARTEL	78B CNTR	$\psi(2S) \rightarrow \gamma \chi_{c2}$
2.2 ± 1.2		49 BIDDICK	77 CNTR	$e^+ e^- \rightarrow \gamma X$
1.2 ± 0.7		47 WHITAKER	76 MRK1	$e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.85 ± 0.04 ± 0.07	1.9k	50 ADAM	05A CLEO	$\psi(2S) \rightarrow J/\psi \gamma \gamma$



$$\mathcal{B}(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) \times \mathcal{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))$$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow \gamma J/\psi) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \text{anything})}$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
2.88 ± 0.05 OUR FIT				
$3.11 \pm 0.07 \pm 0.07$	1.9k	ADAM	05A CLEO	$\psi(2S) \rightarrow J/\psi \gamma \gamma$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)}$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
5.08 ± 0.18 OUR FIT				
4.2 ± 1.1 OUR AVERAGE				
6.0 \pm 2.8	1.3k	51 ABLIKIM	04B BES	$\psi(2S) \rightarrow J/\psi X$
3.9 \pm 1.2		52 HIMEL	80 MRK2	$\psi(2S) \rightarrow \gamma \chi_{c2}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.52 \pm 0.13 \pm 0.13	1.9k	50 ADAM	05A CLEO	$\psi(2S) \rightarrow J/\psi \gamma \gamma$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow \gamma \gamma) \times \mathcal{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))$$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
2.09 ± 0.19 OUR FIT			
$7.0 \pm 2.1 \pm 2.0$	LEE	85 CBAL	$\psi(2S) \rightarrow \gamma \chi_{c2}$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow \pi\pi) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}$$

<u>VALUE (units 10⁻³)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.54±0.05 OUR FIT				
0.54±0.06 OUR AVERAGE				
0.66±0.18±0.37	21 ± 6	53 BAI	03C BES	$\psi(2S) \rightarrow \gamma\pi^0\pi^0$
0.54±0.05±0.04	185 ± 16	54 BAI	98I BES	$\psi(2S) \rightarrow \gamma\pi^+\pi^-$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow 2(\pi^+\pi^-)) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}$$

<u>VALUE (units 10⁻³)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
3.1±0.4 OUR FIT			
3.1±1.0 OUR AVERAGE	Error includes scale factor of 2.5.		
2.3±0.1±0.5	55 BAI	99B BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$
4.3±0.6	56 TANENBAUM	78 MRK1	$\psi(2S) \rightarrow \gamma\chi_{c2}$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow K^+K^-K^+K^-) \times \mathcal{B}(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))$$

<u>VALUE (units 10⁻⁴)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.45±0.20 OUR FIT				
1.76±0.16±0.24	160	57 ABLIKIM	06T BES2	$\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow K^+K^-K^+K^-) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}$$

<u>VALUE (units 10⁻⁴)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
4.5±0.4 OUR FIT			
3.6±0.6±0.6	58 BAI	99B BES	$\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow \phi\phi) \times \mathcal{B}(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))$$

<u>VALUE (units 10⁻⁴)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.42±0.29 OUR FIT				
1.38±0.24±0.23	41	59 ABLIKIM	06T BES2	$\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

$$\mathcal{B}(\chi_{c2}(1P) \rightarrow \phi\phi) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}$$

<u>VALUE (units 10⁻⁴)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
4.4±0.4 OUR FIT			
4.8±1.3±1.3	60 BAI	99B BES	$\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

⁴⁴ Calculated by us. The value for $\mathcal{B}(\chi_{c2} \rightarrow p\bar{p})$ reported in BAI 98I is derived using $\mathcal{B}(\psi(2S) \rightarrow \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $\mathcal{B}(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

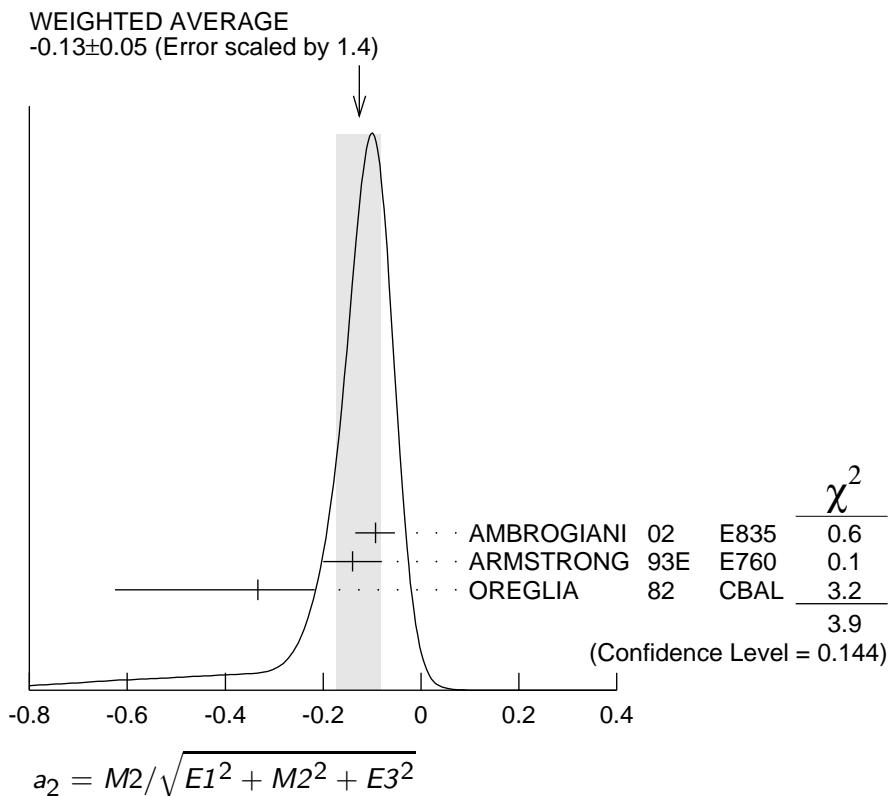
⁴⁵ Calculated by us. The value for $\mathcal{B}(\chi_{c2} \rightarrow K^+K^-)$ reported by BAI 98I is derived using $\mathcal{B}(\psi(2S) \rightarrow \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $\mathcal{B}(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

- 46 Calculated by us. The value of $B(\chi_{c2} \rightarrow K_S^0 K_S^0)$ reported by BAI 99B was derived using $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].
- 47 Recalculated by us using $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1181 \pm 0.0020$.
- 48 Recalculated by us using $B(J/\psi(1S) \rightarrow \mu^+ \mu^-) = 0.0588 \pm 0.0010$.
- 49 Assumes isotropic gamma distribution.
- 50 Not independent from other values reported by ADAM 05A.
- 51 From a fit to the J/ψ recoil mass spectra.
- 52 The value for $B(\psi(2S) \rightarrow \gamma \chi_{c2}) \times B(\chi_{c2} \rightarrow \gamma J/\psi(1S))$ reported in HIMEL 80 is derived using $B(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) = (33 \pm 3)\%$ and $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.138 \pm 0.018$. Calculated by us using $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = (0.1181 \pm 0.0020)$.
- 53 We have multiplied $\pi^0 \pi^0$ measurement by 3 to obtain $\pi\pi$.
- 54 Calculated by us. The value for $B(\chi_{c2} \rightarrow \pi^+ \pi^-)$ reported by BAI 98I is derived using $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. We have multiplied $\pi^+ \pi^-$ measurement by 3/2 to obtain $\pi\pi$.
- 55 Calculated by us. The value for $B(\chi_{c2} \rightarrow 2\pi^+ 2\pi^-)$ reported in BAI 99B is derived using $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].
- 56 The value for $B(\psi(2S) \rightarrow \gamma \chi_{c2}) \times B(\chi_{c2} \rightarrow 2\pi^+ \pi^-)$ reported in TANENBAUM 78 is derived using $B(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) \times B(J/\psi(1S) \ell^+ \ell^-) = (4.6 \pm 0.7)\%$. Calculated by us using $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1181 \pm 0.0020$.
- 57 Calculated by us. The value of $B(\chi_{c2} \rightarrow 2K^+ 2K^-)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4)\%$.
- 58 Calculated by us. The value of $B(\chi_{c2} \rightarrow 2K^+ 2K^-)$ reported by BAI 99B was derived using $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].
- 59 Calculated by us. The value of $B(\chi_{c2} \rightarrow \phi\phi)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4)\%$.
- 60 Calculated by us. The value of $B(\chi_{c2} \rightarrow \phi\phi)$ reported by BAI 99B was derived using $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

MULTIPOLE AMPLITUDES IN $\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)$ RADIATIVE DECAY

$a_2 = M2 / \sqrt{E1^2 + M2^2 + E3^2}$ Magnetic quadrupole fractional transition amplitude

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
-0.13 ± 0.05 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.		
-0.093 $^{+0.039}_{-0.041}$ ± 0.006	5908	61 AMBROGIANI 02	E835	$p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi \gamma$
-0.14 ± 0.06	1904	61 ARMSTRONG 93E	E760	$p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi \gamma$
-0.333 $^{+0.116}_{-0.292}$	441	61 OREGLIA	82 CBAL	$\psi(2S) \rightarrow \chi_{c1} \gamma \rightarrow J/\psi \gamma \gamma$



$$a_2 = M2 / \sqrt{E1^2 + M2^2 + E3^2}$$

$a_3 = E3 / \sqrt{E1^2 + M2^2 + E3^2}$ Electric octupole fractional transition amplitude

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$0.011^{+0.041}_{-0.033}$ OUR AVERAGE				
$0.020^{+0.055}_{-0.044} \pm 0.009$	5908	AMBROGIANI 02	E835	$p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$
$0.00^{+0.06}_{-0.05}$	1904	ARMSTRONG 93E	E760	$p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$

⁶¹ Assuming $a_3=0$.

$\chi_{c2}(1P)$ REFERENCES

ADAMS 07	PR D75 071101R	G.S. Adams <i>et al.</i>	(CLEO Collab.)
ATHAR 07	PR D75 032002	S.B. Athar <i>et al.</i>	(CLEO Collab.)
ABLIKIM 06D	PR D73 052006	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM 06I	PR D74 012004	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM 06R	PR D74 072001	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM 06T	PL B642 197	M. Ablikim <i>et al.</i>	(BES Collab.)
DOBBS 06	PR D73 071101R	S. Dobbs <i>et al.</i>	(CLEO Collab.)
ABLIKIM 05G	PR D71 092002	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM 05N	PL B630 7	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM 05O	PL B630 21	M. Ablikim <i>et al.</i>	(BES Collab.)
ADAM 05A	PRL 94 232002	N.E. Adam <i>et al.</i>	(CLEO Collab.)
ANDREOTTI 05A	NP B717 34	M. Andreotti <i>et al.</i>	(FNAL E835 Collab.)
NAKAZAWA 05	PL B615 39	H. Nakazawa <i>et al.</i>	(BELLE Collab.)
ABLIKIM 04B	PR D70 012003	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM 04H	PR D70 092003	M. Ablikim <i>et al.</i>	(BES Collab.)
ATHAR 04	PR D70 112002	S.B. Athar <i>et al.</i>	(CLEO Collab.)
BAI 04F	PR D69 092001	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI 04I	PR D70 012006	J.Z. Bai <i>et al.</i>	(BES Collab.)
AULCHENKO 03	PL B573 63	V.M. Aulchenko <i>et al.</i>	(KEDR Collab.)

BAI	03C	PR D67 032004	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	03E	PR D67 112001	J.Z. Bai <i>et al.</i>	(BES Collab.)
ABE	02T	PL B540 33	K. Abe <i>et al.</i>	(BELLE Collab.)
AMBROGIANI	02	PR D65 052002	M. Ambrogiani <i>et al.</i>	(FNAL E835 Collab.)
EISENSTEIN	01	PRL 87 061801	B.I. Eisenstein <i>et al.</i>	(CLEO Collab.)
AMBROGIANI	00B	PR D62 052002	M. Ambrogiani <i>et al.</i>	(FNAL E835 Collab.)
ACCIARRI	99E	PL B453 73	M. Acciari <i>et al.</i>	(L3 Collab.)
BAI	99B	PR D60 072001	J.Z. Bai <i>et al.</i>	(BES Collab.)
ACKER...K...	98	PL B439 197	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
BAI	98D	PR D58 092006	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	98I	PRL 81 3091	J.Z. Bai <i>et al.</i>	(BES Collab.)
DOMINICK	94	PR D50 4265	J. Dominick <i>et al.</i>	(CLEO Collab.)
ARMSTRONG	93	PRL 70 2988	T.A. Armstrong <i>et al.</i>	(FNAL E760 Collab.)
ARMSTRONG	93E	PR D48 3037	T.A. Armstrong <i>et al.</i>	(FNAL-E760 Collab.)
BAUER	93	PL B302 345	D.A. Bauer <i>et al.</i>	(TPC Collab.)
ARMSTRONG	92	NP B373 35	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)
Also		PRL 68 1468	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)
BAGLIN	87B	PL B187 191	C. Baglin <i>et al.</i>	(R704 Collab.)
BAGLIN	86B	PL B172 455	C. Baglin	(LAPP, CERN, GENO, LYON, OSLO+)
GAISER	86	PR D34 711	J. Gaiser <i>et al.</i>	(Crystal Ball Collab.)
LEE	85	SLAC 282	R.A. Lee	(SLAC)
LEMOIGNE	82	PL 113B 509	Y. Lemoigne <i>et al.</i>	(SACL, LOIC, SHMP+)
OREGLIA	82	PR D25 2259	M.J. Oreglia <i>et al.</i>	(SLAC, CIT, HARV+)
Also		Private Comm.	M.J. Oreglia	(EFI)
BARATE	81	PR D24 2994	R. Barate <i>et al.</i>	(SACL, LOIC, SHMP, CERN+)
HIMEL	80	PRL 44 920	T. Himel <i>et al.</i>	(LBL, SLAC)
Also		Private Comm.	G. Trilling	(LBL, UCB)
BRANDELIK	79B	NP B160 426	R. Brandelik <i>et al.</i>	(DASP Collab.)
BARTEL	78B	PL 79B 492	W. Bartel <i>et al.</i>	(DESY, HEIDP)
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum <i>et al.</i>	(SLAC, LBL)
Also		Private Comm.	G. Trilling	(LBL, UCB)
BIDDICK	77	PRL 38 1324	C.J. Biddick <i>et al.</i>	(UCSD, UMD, PAVI+)
WHITAKER	76	PRL 37 1596	J.S. Whitaker <i>et al.</i>	(SLAC, LBL)

OTHER RELATED PAPERS

ABLIKIM	04I	PR D70 092004	M. Ablikim <i>et al.</i>	(BES Collab.)
BARBERIS	00G	PL B485 357	D. Barberis <i>et al.</i>	(Omega Expt.)
ACCIARRI	99T	PL B461 155	M. Acciari <i>et al.</i>	(L3 Collab.)
CHEN	90B	PL B243 169	W.Y. Chen <i>et al.</i>	(CLEO Collab.)
AIHARA	88D	PRL 60 2355	H. Aihara <i>et al.</i>	(TPC Collab.)
BARATE	83	PL 121B 449	R. Barate <i>et al.</i>	(SACL, LOIC, SHMP, IND)
FELDMAN	75B	PRL 35 821	G.J. Feldman <i>et al.</i>	(LBL, SLAC)
Also		PRL 35 1189	G.J. Feldman	(LBL, SLAC)
Erratum.				
TANENBAUM	75	PRL 35 1323	W.M. Tanenbaum <i>et al.</i>	(LBL, SLAC)